HR-177 Concrete Bridge Deck Repair Using Injected Epoxy Resin

Key Words: Bridge decks, Spalling, Delaminations, Injected epoxy resin

ABSTRACT

Maintenance of spalled bridge decks requires constant surveillance and the commitment of considerable manpower and equipment by maintenance forces. Maintenance cost for deck repair was $68,000 in Fiscal Year 1977 and $83,400 in Fiscal Year 1978.

Patching of spalled areas with bituminous material is a temporary repair, at best. It will help reduce traffic impact loadings on the structure but will do nothing to pre-vent further deterioration of the decks. It is usually noted that concrete around the spalled area delaminates (or is delaminated at the time the bituminous material is placed) this, in turn, spalls increasing the area of deterioration.

Research funds were approved for the purchase of equip-ment designed to proportion and inject epoxy resins into delaminated areas of bridge decks. Through investigation and refining of this process, it was anticipated that a maintenance procedure would be developed to delay spalling of bridge decks by "gluing down" delaminated areas before spalling occurred.

Results to date would indicate that using a machine for proportioning and pumping epoxy into delaminated areas to delay spalling in bridge decks is a viable maintenance pro-cedure when large delaminated areas are present. Those instances that seem most adaptable to epoxy injection are bridges that have developed delaminated areas but do not exhibit very much spalling.

Bridges with "v" type spalling over reinforc-ing steel or small (2 to 3 sq. ft.) hollow areas around spalls can be repaired more economically with partial depth PCC patches using low slump concrete.

The use of the machine to proportion and inject epoxy into damaged PCC beams has only limited application. Injection of cracked beams can be more efficiently accomp-lished mixing small portions of epoxy and using hand tools for injection.

Continued observation and monitoring of repaired deck areas will be required to determine long term results.

Development of epoxies with lower viscosity, longer pot life and shorter cure time would increase the adaptability of the machine to our maintenance operations.

There has been only a limited opportunity to use the epoxy injection process to rebond delaminated areas in bridge decks, however, results to date would indicate that there are instances where this repair procedure can be used advantage-ously. Bridge decks having relatively large delaminated areas and very little spalling would be recommended candidates for repair by the epoxy injection method.

Continued monitoring of the bridge deck on I-80 near Grinnell will be necessary to determine the longevity of the repair. A year and a half after this repair was completed, it was estimated that 80% of the area remained "glued together". There has been very little change since then.

Additional training for personnel in the use of the machine and familiarization with the procedures will be required to increase efficiency in accomplishing the re-bonding, but it is believed that the procedure has definite application in bridge deck maintenance.